SULFUR DIOXIDE (SO_2)

NATURE AND SOURCES

Sulfur dioxide (SO_2), a member of the sulfur oxide (SO_x) family of gases, is formed from burning fuels containing sulfur (e.g., coal or oil), extracting gasoline from oil, or extracting metals from ore. SO_2 can also dissolve in water vapor to form acid and can interact with ammonia and particles to form sulfates and other chemical products that can be harmful to people and the environment. The monitoring network measures concentrations of SO_2 in the air to compare with national air quality standards, and EPA tracks national emissions of SO_2. Eighty-seven percent of the SO_2 released into the air is attributable to fuel combustion. Other sources of SO_2 emissions include industrial facilities such as petroleum refineries, cement manufacturing facilities, and metal processing facilities. Additionally, locomotives, large ships, and some non-road diesel equipment currently burn high sulfur fuels that emit SO_2.

HEALTH AND ENVIRONMENTAL EFFECTS

SO_2 causes a wide variety of health and environmental impacts. Particularly sensitive groups include asthmatics who are active outdoors, children, the elderly, and people of any age with heart or lung disease. Longer-term exposures to high levels of SO_2 gases and related particles have been shown to cause respiratory illness and aggravate existing heart disease. Sulfate particles can gather in the lungs, causing respiratory symptoms and disease, difficulty in breathing, and premature death. Sulfate particles are the major cause of reduced visibility in many parts of the U.S., including national parks. SO_2 is also a major contributor to acid rain.

TRENDS IN SO_2 CONCENTRATIONS

There are two standards for SO_2: an annual standard (0.03 ppm) and a daily standard (0.14 ppm). The annual standard is the focus in this report. Nationally, concentrations of annual SO_2 decreased 53 percent between 1990 and 2006, as shown in Figure 27. In 2006, annual SO_2 concentrations were generally the lowest of the 17-year period. All concentrations were below the level of the annual standard. One site in Northampton County, Pa., showed concentrations above the level of the daily standard in 2006.

TRENDS IN SO_2 EMISSIONS

Since 1990, SO_2 emissions have decreased 38 percent, as shown in Figure 28. Emissions from fuel combustion, industrial processes, and transportation sources decreased 41, 40, and 30 percent, respectively.

The observed reductions in SO_2 concentrations and emissions since 1990 are mainly due to controls implemented under EPA's Acid Rain Program, which began in 1995.

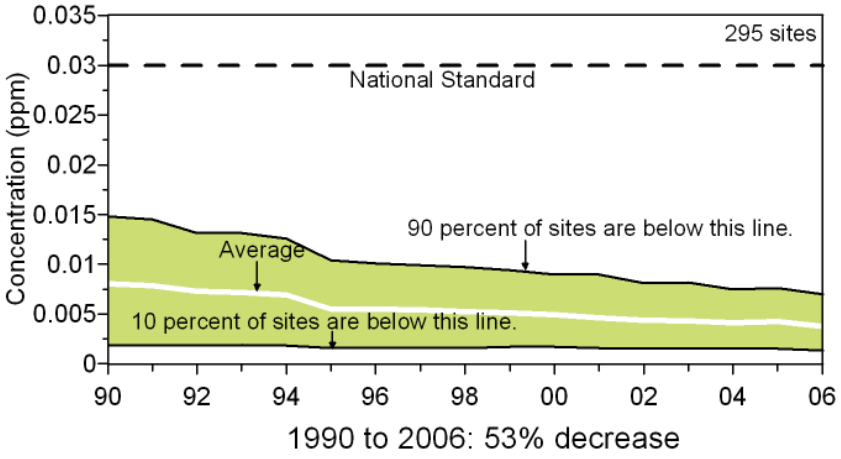

Figure 27. National SO_2 air quality trend, 1990-2006 (annual average).

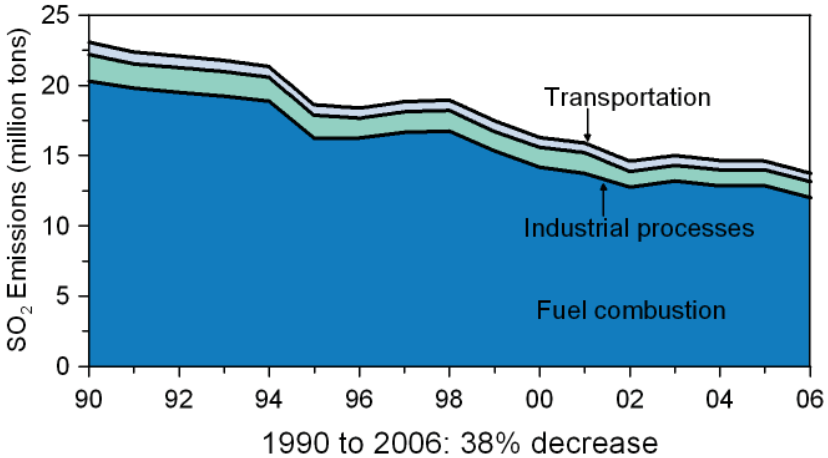

Figure 28. National trends in annual SO_2 emissions, 1990-2006.